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ORIGINAL ARTICLE

Frequency of Vitamid Deficiency in Patients with Acute ST Elevation MI

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ABSTRACT

Objective: Vitamin D deficiency in individuals with acute ST Elevation is the goal of this study.
Stud Design: Case control/Prospective study
Place and Duration: Conducted at Islamabad medical and dental college, Islamabad. Duration was six months from 1st July, 2021 to 31st Dec, 2021.
Methods: There were one hundred and six patients were presented in this study. ACS patients were included if they had ST elevation myocardial infarction (STEMI) or not if they had non-STEMI. Informed permission was obtained prior to obtaining demographic data on the enrolled patients. These demographics included age, sex, BMI, and any co-morbidities they may have. Patients were divided in two groups, group I had 53 patients had ST elevation myocardial infarction (STEMI) and group B had 53 patients without STEMI. Frequency of vitamin deficiency among both groups were assessed and compared. SPSS 24.0 was used to analyze complete data.
Results: There were majority males 68 (64.2%) and 38 (35.8%) females among all patients. Mean age of the patients was 56.8±11.53 years with mean BMI 27.12±14.43 kg/m^2 in group I and in group II mean age was 54.13±6.23 years and had mean BMI 25.7±10.51 kg/m^2. Hypertension, diabetes mellitus, myocardial infarction and dyslipidemia were the commonest comorbidities found among all cases. Frequency of vitamin D deficiency in group I was higher found in 42 (79.2%) cases as compared to group II found in 22 (41.5%) cases with p value <0.004.Frequency of vitamin D insufficiency was also higher in patients with STEMI.
Conclusion: Vitamin D deficiency and insufficiency were shown to be more common in individuals with acute coronary syndrome, including ST-elevation myocardial infarction (STEMI). People with ACS who had a vitamin D deficit were more likely to have an ST-elevation myocardial infarction (MI).
Keywords: Acute coronary syndrome, ST elevation myocardial infarction (STEMI), Vitamin D Deficiency, Comorbidities

INTRODUCTION

Mortality and morbidity due to cardiovascular disease have been a substantial burden on Bahrain's healthcare system and are a common occurrence among the country's citizens. In Bahrain, vitamin D deficiency is a major public health issue, and it's much more frequent than in other countries. People with darker complexion, hospitalisation, and drugs that speed up vitamin D metabolism all lead to low levels of vitamin D [1]. To be considered deficient in vitamin D, a person must have a serum 25-hydroxyvitamin D concentration below 20 ng/ml. Musculoskeletal mortality is well-known to be caused by vitamin D deficiency, and there has been increasing evidence that vitamin D has both skeletal and non-skeletal effects.[2] While the cardiovascular system seems to be a significant target for vitamin D's activity, the mechanism supporting this is not entirely known. A vitamin D receptor may be found in the smooth muscle of the blood vessels and the heart muscle cells. Several animal investigations have shown that by binding vitamin D to these receptors, a variety of potentially favourable cardiovascular advantages, such as relaxing of the smooth muscle and the decrease of atherosclerosis producing foam cells, may occur [3,4].

It is thought that vitamin D deficiency has an effect on endothelial dysfunction via activating the renin-angiotensin system or by promoting the proliferation of smooth muscle and an inflammatory state.[5] Numerous studies have linked vitamin D insufficiency to cardiovascular illnesses (CVD), such as hypertension, acute myocardial infarction, heart failure, coronary artery disease (CAD), metabolic syndrome, and diabetes mellitus (DM) [6–7]. The majority of the population is vitamin D deficient.

Deficiencies in vitamin D and polyunsaturated fatty acids have been linked to cardiovascular disease. Hypovitaminosis D has been linked to cardiovascular disease (CVD) risk factors such as hypertension, obesity, dyslipidemia, and diabetes mellitus. There is a U-shape or reverse J-curve related with higher overall and cardiovascular mortality if high levels are present. [8] At altitudes greater than 1000 metres in Subtropical Northern Argentina, a study conducted by Naesgaard et al. in 2013[9] discovered a link between higher levels of vitamin D in women than in men, and a 2–5 year reduction in total and cardiac mortality in this population with chronic coronary artery disease. As a result, we sought to determine the prevalence of Vitamin D insufficiency and if it plays a role in the incidence of acute coronary syndromes (ACS).

Anemia, a rise in metabolic syndrome, and endothelial dysfunction are all linked to low vitamin D levels, which in turn increases the risk of cardiovascular disorders such coronary artery disease and heart failure.[1] With individuals with elevated ST segment, we report the incidence of Vitamin D insufficiency Myocardial infarction (STEMI), the most common and serious form of acute coronary artery disease presentation.

MATERIAL AND METHODS

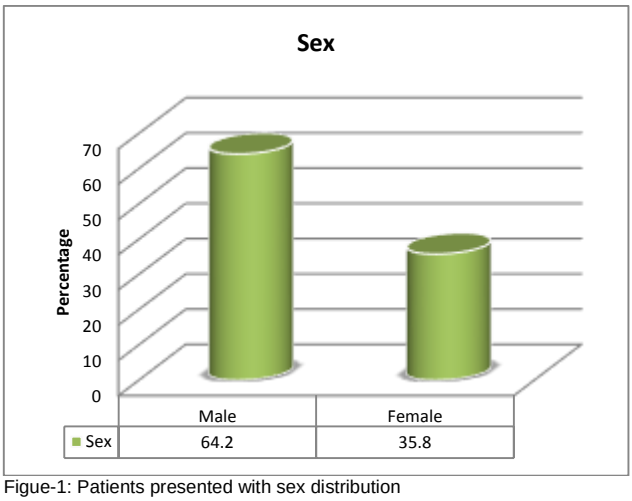
This cases control/prospective study was conducted at Conducted at Islamabad medical and dental college, Islamabad. Duration was six months from 1st July, 2021 to 31st Dec, 2021 and comprised of 106 patients. Informed permission was obtained prior to obtaining demographic data on the enrolled patients. These demographics included age, sex, BMI, and any co-morbidities they may have.Exclusion criteria for this research were the presence of autoimmune or inflammatory illnesses, pregnancy or acute or chronic renal or hepatic impairment, and recent use of vitamin D supplementation.

Age of the included cases was 20-80 years.All patients with acute coronary syndrome (ACS) were included in the study, regardless of whether or not they experienced an ST-elevation myocardial infarction (STEMI). For the determination of 25-hydroxyvitamin D (25(OH) D) plasma levels in patients with an acute MI, blood samples had to be collected. There were tests to investigate whether the amount of 25-hydroxyvitamin D in the blood linked with the severity of an acute MI. 25-hydroxyvitamin D levels were measured using an Enzyme-Linked Immune-Sorbent Assay (ELISA) and an Absorbance Reader (2020 sw-version 2.0

up) (Euroimmun, Germany). Cutoff value for this method was determined to be a vitamin D concentration of 0 ng/mL The kit had predicted a range of 0 - 120 ng/mL, and the results fell within that range as well. Blood levels of 25-hydroxyvitamin D less than 30 ng/mL were judged to be inadequate in the study Individuals with low levels of 25-hydroxyvitamin D serum levels were divided into three groups. It was found that those in groups A, B, and C had vitamin D levels between 15 and 30 ng/mL, whereas those in group C had a level below 10 ng/mL. Independent t-tests and the Mann-Whitney U tests may also be used to compare two sets of variables. The Chi-square and Fisher's exact tests were used to compare qualitative data (frequency). The data was analysed using Spearman's rank-order correlation coefficient. The association between the study's research variables was also examined using logistic regression. Statistical significance was defined as less than 0.05 in all of the investigations. SPSS 24.0 was used to evaluate the whole set of information provided.

RESULTS

There were majority males 68 (64.2%) and 38 (35.8%) females among all patients.(fig 1)



Figue-1: Patients presented with sex distribution

Mean age of the patients was 56.8±11.53 years with mean BMI 27.12±14.43 kg/m^2 in group I and in group II mean age was 54.13±6.23 years and had mean BMI 25.7±10.51 kg/m^2. Hypertension, diabetes mellitus, myocardial infarction and dyslipidemia were the commonest comorbidities found among all cases.(table 1)

Table-1: The demographics of the patients who were enrolled

Variables	Group I	Group II
Mean age (years)	56.8±11.53	54.13±6.23
Mean BMI (kg/m^2	27.12±14.43	25.7±10.51
Comorbidities		
HTN	22 (41.5%)	19 (35.8%)
DM	17 (32.1%)	21 (39.6%)
MI	8 (51.1%)	9 (16.9%)
dyslipidemia	6 (11.3%)	4 (7.5%)
Total	54 (100)	54 (100)

Frequency of vitamin D deficiency in group I was higher found in 42 (79.2%) cases as compared to group II found in 22 (41.5%) cases with p value <0.004.Frequency of vitamin D insufficiency was also higher in patients with STEMI.(fig 2)

Mean fasting blood glucose in group I was 115.4±24.35 mg/dl and in group II was 134.4±12.45 mg/dl. Mean vitamin D level in group I was 14.8±12.19 mg/dl and in group II was 26.6±9.16 mg/dl. There was no any difference found in creatinine, Blood Urea Nitrogen and hemoglobin level among both groups.(table 2)

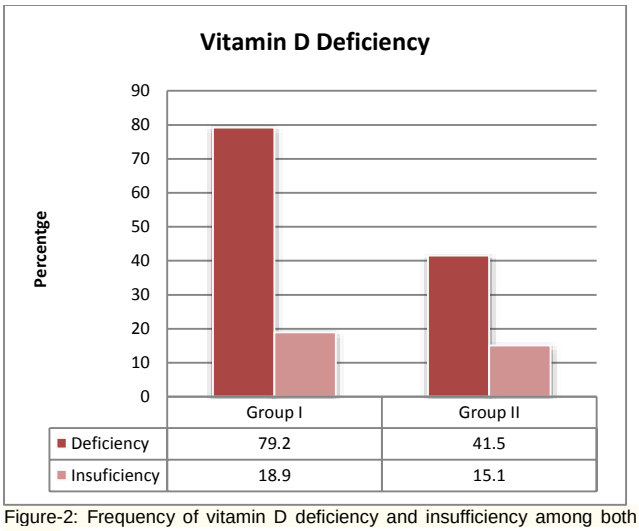


Figure-2: Frequency of vitamin D deficiency and insufficiency among both groups

Table-2: Comparison of glucose level and vitamin D level among both groups

Variables	Group I	Group II
Mean fasting blood glucose (mg/dl)	115.4±24.35	134.4±12.45
Mean vitamin D level (mg/dl)	14.8±12.19	26.6±9.16
Mean creatinine (mg/dl)	1.15±1.4	1.14±1.5
Mean Blood Urea Nitrogen (mg/dl)	19.4±7.13	17.9±3.19
Mean hemoglobin level (g/dl)	14.5±4.3	14.3±1.16

DISCUSSION

Vitamin D deficiency is a common health issue that affects people all over the globe. [11] Myocardial infarction was the focus of the vast majority of investigations. Saudi Arabian researchers studied the effects of vitamin D2 and D3 on cardiovascular disease (CVD) patients as well as age and gender-matched controls without CVD.

Acute myocardial infarction (MI) types were compared to see whether there was a link between 25-hydroxy vitamin D levels. A lack of vitamin D was shown to be a risk factor for STEMI, according to the findings. Vitamin D insufficiency, on the other hand, has been linked to a more serious kind of MI that is accompanied with ST segment elevation on electrocardiography.

In current stud 106 patients were presented.Patients were divided in two groups, group I had 53 patients had ST elevation myocardial infarction (STEMI) and group B had 53 patients without STEMI.There were majority males 68 (64.2%) and 38 (35.8%) females among all patients. Mean age of the patients was 56.8±11.53 years with mean BMI 27.12±14.43 kg/m^2 in group I and in group II mean age was 54.13±6.23 years and had mean BMI 25.7±10.51 kg/m^2. Results of current study was comparable to the previous studies.[12,13]Hypertension, diabetes mellitus, myocardial infarction and dyslipidemia were the commonest comorbidities found among all cases.[14]

Vitamin D insufficiency was identified in 42 (79.2%) instances in group I, compared to 22 (41.5%) in group II with a p value less than 0.01 in both groups. Vitamin D deficiency was shown to be more common in individuals with a STEMI. Cardiovascular disease and acute myocardial infarction (AMI) are more likely in people of many ethnicities who don't get enough 25-hydroxyvitamin D. [15,16] A 25(OH)D deficiency has been linked to more severe coronary artery disease by coronary angiography. [17] When compared to individuals with 25(OH)D insufficiency, those with normal blood levels of 25(OH)D had a lower risk of getting AMI. [18] The newly published systematic review and meta-analysis comprised 73 cohort studies and 22 randomised controlled trials with an estimated 880,128 participants. Dietary vitamin D insufficiency was connected to an elevated risk of cardiovascular disease mortality. When taken alone, vitamin D3

has been shown to reduce mortality from any cause by 11%. Vitamin D2 supplementation, on the other hand, had no effect on death rates.[19]

Vitamin D deficiency has been linked to an increased risk of heart disease, while other studies have shown no correlation at all. Using data from the MINI-Finland Health Survey, which included 6,219 men and women > 30 years old who were free of cardiovascular disease, a median follow-up of 27 years revealed no link between vitamin D and coronary heart disease fatalities (HR: 0.91; 95 percent CI 0.70 to 1.18; p = 0.020). Seasonal and conventional cardiovascular risk variables were taken into account while analysing the data. [20]

Mean fasting blood glucose in group I was 115.4±24.35 mg/dl and in group II was 134.4±12.45 mg/dl. Mean vitamin D level in group I was 14.8±12.19 mg/dl and in group II was 26.6±9.16 mg/dl. There was no any difference found in creatinine, Blood Urea Nitrogen and hemoglobin level among both groups.[19,20] In diabetic patients with ACS, Gondim et al.[21] examined blood 25-OHD concentrations to determine the patients' Vitamin D status and the relationship between it and the severity of the illness. Vitamin D insufficiency has been linked to more severe ACS and is a predictor of more widespread coronary artery disease in people with type 2 diabetes, the researchers found in their study. High Vitamin D insufficiency among patients with ACS was verified in 2013[22] by Luis et al (98 percent). Karur et al. in 2014[23] reported that 67.5 percent of patients in their research had 25-hydroxyvitamin D deficiency and 16 percent had inadequate levels, resulting in an abnormally low 25-vitamin D level in 83.5 percent of patients. There was no statistically significant difference in Vitamin D levels amongst ACS subgroups (UA, STEMI, and NSTEMI) in our research.

Deficiency in vitamin D has long been associated to cardiovascular disease, and our study indicated that the chance of a STEMI in vitamin D deficient people was around 8 times greater than in other ACS patients. Chemical processes and clinical observations lead to this conclusion, which is supported by the results above. Some studies, on the other hand, have failed to establish a clinical relationship between low vitamin D levels and cardiovascular disease. Vitamin D supplementation has not been shown to benefit cardiovascular health in a way that is definitive, and a number of studies have shown results that were inconsistent. Changes in research design, demographic and genetic variables, and variations in dose and duration of vitamin D therapy are only some of the possible explanations for these results.

CONCLUSION

Vitamin D deficiency and insufficiency were shown to be more common in individuals with acute coronary syndrome, including ST-elevation myocardial infarction (STEMI). People with ACS who had a vitamin D deficit were more likely to have an ST-elevation myocardial infarction (MI).

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